

Article, February 6, 1879, with transcript

L COPY AUTOBIOGRAPHY OF A. G. BELL.

Thursday, Feb. 6, 1879 — In the year 1864 my father perfected the system of physiological symbols which was afterwards published in a work entitled “Visible Speech the Science of Universal Alphabetics.”

These symbols represent the positions of the vocal organs in forming sounds; and it had been for years my fathers object to analyze the various elements of English and foreign sounds, and to represent them by means of his physiological characters, so that students should be able to produce English and foreign sounds from the symbolical description of their organic forms without the necessity of hearing the sound uttered.

My father was a great student of philology and he hoped by means of his system to be able to preserve for the benefit of future philologists and linguists the dialects of England and Scotland which are now fast dying out, on account of the introduction of railroads and steamboats and other means of quick communication between different parts of the country. He discovered that when certain English and dialectic vowels were arranged in a certain order and whispered that there seemed to be a musical relation between the vowel elements of the scale. As I was considered to have a very correct musical ear, my father requested my assistance in determining the relative pitches of these different vowels. To my ear the vowels as uttered by my father and myself occasioned the impression of a descending musical scale; but to my father's ear the effect was exactly the reverse.

For a long time it seemed to be impossible to agree upon the relative pitches of any of the vowels excepting the close aperture vowels until I made the discovery that each of the vowels possessed a double pitch; and that in the scale of vowels referred to above the pitches ascended and descended simultaneously.

My attention thus being drawn to the musical character of whispered vowels I made experiments upon my own mouth to determine the cause of the double pitch heard. When a vowel position of the tongue is assumed, there is generally over some portion of the tongue a constricted aperture, so that the whole mouth cavity extends from the lips to the vocal cords assuming somewhat the shape of two bottles placed neck to neck. There is one comparatively large cavity in front of the constricted position, another cavity comprising the pharynx and larynx behind it. The idea occurred to me that the two pitches heard when A is whispered are due to the resonance of these two cavities. I proved the matter very satisfactorily by setting the air in the cavities in vibration, by tapping a pencil or a piece of held in front of one mouth or against the throat.

On assuming silently the positions for the vowels in the order in which my father had placed them, I found upon tapping the pencil in front of the mouth that a descending series of musical tones was audible and upon tapping the throat an ascending series.

In the year 1866 1865–66 I was a teacher in “Western House Academy” in Elgin, Murrayshire and during that year I made a number of experiments to determine the exact pitches of the mouth cavities for the various English vowel sounds, for this purpose I obtained a large number of tuning forks of different pitches my mode of proceeding was as follows:—

Assuming silently the position for some vowel sound I held the tuning forks while in a state of vibration, one by one, in front of the mouth, and I found that each vowel position caused the reinforcement of two forks of different pitches. I was thus led to the belief, that vowel 3 sounds consisted of the blending of two faint, fixed musical tones with the sound produced by the voice, and that these fixed tones were the resonance pitches of the cavities in front of and behind the constricted aperture in the mouth a description of which constituted what was called a of the vowel sound.

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During the year 1866 I made a musical analysis of all the vowels with which I was acquainted and forwarded the results of my experiments to the distinguished linguist and philologist Mr. Alexander J. Ellis of London. Mr. Ellis in reply, informed me that the experiments I had undertaken had been already performed in Germany by Prof. Helmholtz and that Helmholtz had gone a great deal further than I had for he had not only analyzed vowel sounds into their component musical elements but had actually performed the synthesis of them. Helmholtz, I was informed, by an ingenious arrangement of tuning forks which were kept in continuous vibration by means of an electrical current and a system of resonators, whereby he could regulate the relative intensities of the sounds produced by his tuning forks, he had been enabled to build up artificially the human voice. He had made his tuning forks speak vowel sounds.

Mr. Ellis's communication while in one sense a disappointment, because it showed me that my experiments and my deductions from them had been anticipated by others, though still an incentive to further exertion; for my curiosity was raised to the highest pitch and I desired to know more fully the nature and mode of operation of Helmholtz apparatus in reproducing vowel sounds.

In the year 1867 I took advantage of a visit to London to call upon Mr. Ellis, who spent several hours explaining the theories and experiments of Professor Helmholtz. This interview with Mr. Ellis made a lasting impression upon my mind and from it I date my interest in the subject of the electrical production of sound. I was too imperfectly acquainted with the laws of electricity, to understand fully the operation of Helmholtz apparatus; and I commenced at once to study the subject of electricity for the express purpose of understanding Helmholtz experiments.

Without knowing much about the subject, it seemed to me, that if vowel sounds could be produced by electrical means so could consonants, so could articulate speech. Within a few days of my interview with Mr. Ellis I came to believe firmly in the feasibility of the

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telegraphic transmission of speech, and I used to tell my friends, that some day or other we should talk by telegraph.

At that time however I had no idea as to the means by which such a result could be accomplished excepting by some possible modification of Helmholtz apparatus; and I had not the smallest expectation at that time that I would ever be associated with the realization of what was then simply a scientific dream.